This week's PubMed 27th August – 2nd September 2023: articles of interest n = 56

CPR AND COVID-19

No articles identified.

CPR/MECHANICAL CHEST COMPRESSION

No articles identified.

REGISTRIES, REVIEWS AND EDITORIALS

1. Indian Heart J. 2023 Aug 30:S0019-4832(23)00140-2. doi: 10.1016/j.ihj.2023.08.005. Online ahead of print.

Outcomes of out of hospital sudden cardiac arrest in India: A Review and proposed reforms.

Patel H(1), Mahtani AU(2), Mehta LS(3), Kalra A(4), Prabhakaran D(5), Yadav R(6), Naik N(6), Tamirisa KP(7).

ABSTRACT

BACKGROUND: Bystander cardiopulmonary resuscitation (CPR) is the cornerstone in managing out-of-hospital cardiac arrest (OHCA). However, India lacks a formal sudden cardiac arrest (SCA) registry and the infrastructure for a robust emergency medical services (EMS) response system. Also, there exists an opportunity to improve widespread health literacy and awareness regarding SCA. Other confounding variables, including religious, societal, and cultural sentiments hindering timely intervention, need to be considered for better SCA outcomes. OBJECTIVES: We highlight the current trends and practices of managing OHCA in India and lay the groundwork for improving the awareness, education, and infrastructure regarding the management of SCA. CONCLUSION: Effective management of OHCA in India needs collaborative grassroots reformation. Establishing a large-scale SCA registry and creating official and societal guidelines will be pivotal for transforming OHCA patient outcomes.

2. Resuscitation. 2023 Aug 28:109951. doi: 10.1016/j.resuscitation.2023.109951. Online ahead of print.

Trends in use of intraosseous and intravenous access in out-of-hospital cardiac arrest across English Ambulance Services: A registry-based, cohort study.

Vadeyar S(1), Buckle A(1), Hooper A(1), Booth S(2), Deakin CD(3), Fothergill R(4), Ji C(2), Nolan JP(5), Brown M(6), Cowley A(7), Harris E(8), Ince M(9), Marriott R(10), Pike J(11), Spaight R(12), Perkins GD(13), Couper K(14).

ABSTRACT

INTRODUCTION: The optimum route for drug administration in cardiac arrest is unclear. Recent data suggest that use of the intraosseous route may be increasing. This study aimed to explore changes over time in use of the intraosseous and intravenous drug routes in out-of-hospital cardiac arrest in England. METHODS: We extracted data from the UK Out-of-Hospital Cardiac Arrest Outcomes registry. We included adult out-of-hospital cardiac arrest patients between 2015-2020 who were treated by an English Emergency Medical Service that submitted vascular access route data to the registry. The primary outcome was any use of the intraosseous route during cardiac arrest. We used logistic regression models to describe the association between time (calendar month) and

intraosseous use. RESULTS: We identified 75,343 adults in cardiac arrest treated by seven Emergency Medical Service systems between January 2015 and December 2020. The median age was 72 years, 64% were male and 23% presented in a shockable rhythm. Over the study period, the percentage of patients receiving intraosseous access increased from 22.8% in 2015 to 42.5% in 2020. For each study-month, the odds of receiving any intraosseous access increased by 1.019 (95% confidence interval 1.019 to 1.020, p<0.001). This observed effect was consistent across sensitivity analyses. We observed a corresponding decrease in use of intravenous access. CONCLUSION: In England, the use of intraosseous access in out-of-hospital cardiac arrest has progressively increased over time. There is an urgent need for randomised controlled trials to evaluate the clinical effectiveness of the different vascular access routes in cardiac arrest.

3. Lancet. 2023 Aug 25:S0140-6736(23)01560-X. doi: 10.1016/S0140-6736(23)01560-X. Online ahead of print.
Back to basics for out-of-hospital cardiac arrest.
Hansen CM(1), Folke F(2), Granger CB(3).
NO ABSTRACT AVAILABLE

4. Resusc Plus. 2023 Aug 17;15:100453. doi: 10.1016/j.resplu.2023.100453. eCollection 2023 Sep.
PULS - Austrian Cardiac Arrest Awareness Association: An overview of a multi-tiered and multi-facetted regional initiative to save lives.
Schnaubelt S(1)(2), Krammel M(1)(3).
ABSTRACT
BACKGROUND: Out-of-hospital cardiac arrest with subsequent cardiopulmonary resuscitation (CPR) still leads to dismal outcomes worldwide. The crucial gap between cardiac arrest and advanced life support can only be filled by bystander-CPR. However, knowledge and willingness of the public towards basic life support (BLS) remain low. Global and national initiatives for awareness building and CPR training have produced promising improvements, but an additional focus on regional initiatives might be necessary to truly implement change. METHODS AND RESULTS: In order to support other like-minded groups, we present a "coming of age" narrative review of PULS - Austrian Cardiac Arrest Awareness Association, along with a future outlook and "lessons learned". Interviews with past and present employees, members, and functionaries were conducted by the authors. Additionally, the organization's archives were assessed. CONCLUSION: Following current guidelines and the Utstein formula of survival, building a system to save lives is essential to achieve progress concerning cardiac arrest survival and outcomes. As kinds of "regional offices" of global resuscitation efforts, a network of individual local initiatives and organizations such as PULS can carry the respective messages, engage with local key figures of implementation, and keep up perpetual work for cardiac arrest awareness and BLS education.

5. Resusc Plus. 2023 Aug 17;15:100450. doi: 10.1016/j.resplu.2023.100450. eCollection 2023 Sep.
Heart rate and heart rate variability as a prognosticating feature for functional outcome after cardiac arrest: A scoping review.
Kwon SB(1), Megjhani M(1), Nametz D(1), Agarwal S(2), Park S(1)(2)(3).
ABSTRACT
BACKGROUND: Despite significant progress in cardiopulmonary resuscitation and post-cardiac arrest care, favorable outcome in out-of hospital sudden cardiac arrest patients remains low. One of the main reasons for mortality in these patients is withdrawal of life-sustaining treatment. There is a need for precise and equitable prognostication tools to support families in avoiding premature or

inappropriate WLST. Heart rate (HR) and heart rate variability (HRV) have been noted for their association with outcome, and are positioned to be a useful modality for prognostication. OBJECTIVES: The aim of this scoping review is to rigorously explore which electrocardiography features have been shown to predict functional outcome in post-cardiac arrest patients. METHODS: The search was performed in Pubmed, EMBASE, and SCOPUS for studies published from January 1, 2011, to September 29, 2022, including papers in English or Korean. RESULTS: Seven studies were included with a total of 1359 patients. Four studies evaluated HR, one study evaluated RR inverval, and two studies evaluated HRV. All studies were retrospective, with 3 multi-center and 4 single-center studies. All seven studies were inclusive of patients who underwent targeted temperature management (TTM) after cardiac arrest, and two studies included patients without TTM. Five studies used cerebral performance category to assess functional outcome, two studies used Glasgow outcome score, and one study used modified Rankin scale. Three studies measured outcome at hospital discharge, one study measured outcome at 14 days after return of spontaneous circulation, two studies measured outcome after 3 months, and one after 1 year. In all studies that evaluated HR, lower HR was associated with favorable functional outcome. Two studies found that higher complexity of HRV was associated with favorable functional outcome. CONCLUSION: HR and HRV showed clear associations with functional outcome in patients after CA, but cinilcial utility for prognostication is uncertain.

6. J Cardiovasc Med (Hagerstown). 2023 Oct 1;24(10):711-713. doi: 10.2459/JCM.0000000000001548.

Out-of-hospital cardiac arrest and the role of early PCI: will patients with non-ST-segment elevation MI get any benefit from an early invasive approach?

Lettino M(1), Vandoni P.

NO ABSTRACT AVAILABLE

7. Emerg Med J. 2023 Aug 27:emermed-2023-213220. doi: 10.1136/emermed-2023-213220. Online ahead of print.

Trends in survival from out-of-hospital cardiac arrest with a shockable rhythm and its association with bystander resuscitation: a retrospective study.

Hong Tuan Ha V(1), Jost D(2)(3), Bougouin W(3)(4), Joly G(1), Jouffroy R(1)(5), Jabre P(3)(6), Beganton F(3), Derkenne C(1), Lemoine S(1), Frédéric L(1), Lamhaut L(3)(6), Loeb T(7), Revaux F(8), Dumas F(3)(4), Trichereau J(1), Stibbe O(1), Deye N(9)(10), Marijon E(4), Cariou A(4), Jouven X(4), Travers S(1).

ABSTRACT

OBJECTIVE: Over 300 000 cases of out-of-hospital cardiac arrests (OHCAs) occur each year in the USA and Europe. Despite decades of investment and research, survival remains disappointingly low. We report the trends in survival after a ventricular fibrillation/pulseless ventricular tachycardia OHCA, over a 13-year period, in a French urban region, and describe the simultaneous evolution of the rescue system. METHODS: We investigated four 18-month periods between 2005 and 2018. The first period was considered baseline and included patients from the randomised controlled trial 'DEFI 2005'. The three following periods were based on the Paris Sudden Death Expertise Center Registry (France). Inclusion criteria were non-traumatic cardiac arrests treated with at least one external electric shock with an automated external defibrillator from the basic life support team and resuscitated by a physician-staffed ALS team. Primary outcome was survival at hospital discharge with a good neurological outcome. RESULTS: Of 21 781 patients under consideration, 3476 (16%) met the inclusion criteria. Over all study periods, survival at hospital discharge increased from 12% in 2005 to 25% in 2018 ($p<0.001$), and return of spontaneous circulation at hospital admission

increased from 43% to 58% (p=0.004).Lay-rescuer cardiopulmonary resuscitation (CPR) and telephone CPR (T-CPR) rates increased significantly, but public defibrillator use remained limited. CONCLUSION: In a two-tiered rescue system, survival from OHCA at hospital discharge doubled over a 13-year study period. Concomitantly, the system implemented an OHCA patient registry and increased T-CPR frequency, despite a consistently low rate of public defibrillator use.

8. Eur J Emerg Med. 2023 Oct 1;30(5):311-312. doi: 10.1097/MEJ.0000000000001058. Epub 2023 Aug 17.
Out of hospital extracorporeal cardiopulmonary resuscitation: Maybe.
Carr CT(1), Becker TK.
NO ABSTRACT AVAILABLE

9. Resuscitation. 2023 Sep;190:109912. doi: 10.1016/j.resuscitation.2023.109912. Epub 2023 Jul 26.
Where have all the kidneys gone? After ECPR, they are here to stay.
Drabek T(1).
NO ABSTRACT AVAILABLE

10. Eur J Emerg Med. 2023 Oct 1;30(5):313-314. doi: 10.1097/MEJ.0000000000001059. Epub 2023 Jul 7.
Out-of-hospital extracorporeal cardiopulmonary resuscitation: No.
Jaeger D(1)(2), Chouihed T(1)(2).
NO ABSTRACT AVAILABLE

11. Heart. 2023 Aug 24;109(18):1344-1345. doi: 10.1136/heartjnl-2023-322465.
Shortening time to defibrillation in shockable cardiac arrest matters: how do we do it?
Chatterjee NA(1), Rea TD(2).
NO ABSTRACT AVAILABLE

12. Europace. 2023 Aug 25;25(8):euad203. doi: 10.1093/europace/euad203.
Risk stratification of sudden cardiac death: a review.
Tfelt-Hansen J(1)(2), Garcia R(3)(4), Albert C(5), Merino J(6)(7), Krahn A(8), Marijon E(9), Basso C(10), Wilde AAM(11)(12), Haugaa KH(13).
ABSTRACT
Sudden cardiac death (SCD) is responsible for several millions of deaths every year and remains a major health problem. To reduce this burden, diagnosing and identification of high-risk individuals and disease-specific risk stratification are essential. Treatment strategies include treatment of the underlying disease with lifestyle advice and drugs and decisions to implant a primary prevention implantable cardioverter-defibrillator (ICD) and perform ablation of the ventricles and novel treatment modalities such as left cardiac sympathetic denervation in rare specific primary electric diseases such as long QT syndrome and catecholaminergic polymorphic ventricular tachycardia. This review summarizes the current knowledge on SCD risk according to underlying heart disease and discusses the future of SCD prevention.

13. Eur Heart J Acute Cardiovasc Care. 2023 Aug 24;12(8):532-539. doi: 10.1093/ehjacc/zuad060.
Somatosensory evoked potential for post-arrest neuroprognostication.
Kromm J(1)(2)(3)(4), Bencsik C(1)(4), Soo A(1)(4), Ainsworth C(5), Savard M(6), van Diepen S(7)(8), Kramer A(1)(2)(3)(4).
NO ABSTRACT AVAILABLE

14. Resuscitation. 2023 Sep;190:109860. doi: 10.1016/j.resuscitation.2023.109860. Epub 2023 Jun 2.
Identifying individuals satisfying the termination of resuscitation rule but having potential to achieve favourable neurological outcome following out-of-hospital cardiac arrest.
Shibahashi K(1), Kato T(2), Hikone M(2), Sugiyama K(2).

ABSTRACT
AIM: To develop a simple scoring model that identifies individuals satisfying the termination of resuscitation (TOR) rule but having potential to achieve favourable neurological outcome following out-of-hospital cardiac arrest (OHCA). METHODS: This study analysed the All-Japan Utstein Registry from 1 January 2010 to 31 December 2019. We identified patients satisfying basic life support (BLS) and advanced life support (ALS) TOR rules and determined factors associated with favourable neurological outcome (cerebral performance category scale of 1 or 2) for each cohort using multivariable logistic regression analysis. Scoring models were derived and validated to identify patient subgroups that might benefit from continued resuscitation efforts. RESULTS: Among 1,695,005 eligible patients, 1,086,092 (64.1%) and 409,498 (24.2%) satisfied BLS and ALS TOR rules, respectively. One month post-arrest, 2038 (0.2%) and 590 (0.1%) patients in the BLS and ALS cohorts, respectively, achieved favourable neurological outcome. A scoring model derived for the BLS cohort (2 points for age <17 years or ventricular fibrillation/ventricular tachycardia rhythm; 1 point for age <80 years, pulseless electrical activity rhythm, or transport time <25 min) effectively stratified the probability of achieving 1-month favourable neurological outcome, with patients scoring <4 having a probability of <1%, whereas those scoring 4, 5, and 6 having probabilities of 1.1%, 7.1%, and 11.1%, respectively. In the ALS cohort, the probability increased with scores; however, it remained <1%. CONCLUSION: A simple scoring model comprising age, first documented cardiac rhythm, and transport time effectively stratified the likelihood of achieving favourable neurological outcome in patients satisfying the BLS TOR rule.

IN-HOSPITAL CARDIAC ARREST

1. J Crit Care. 2023 Aug 28;78:154404. doi: 10.1016/j.jcrc.2023.154404. Online ahead of print.
Mortality of in-hospital cardiac arrest among patients with and without preceding sepsis: A national inpatient sample analysis.
Hasegawa D(1), Sharma A(2), Dugar S(3), Lee YI(2), Sato R(4).

ABSTRACT
INTRODUCTION: The impact of preceding sepsis on in-hospital cardiac arrest (IHCA)-related mortality has not been established. This study aimed to determine the association between IHCA-related mortality and sepsis. METHODS: This retrospective study used the National Inpatient Sample data from 01/2017 to 12/2019. The study included adults (≥18 years) who suffered from IHCA. The study classified cardiac arrest rhythms as ventricular tachycardia/ventricular fibrillation or pulseless electronic activity/asystole. We compared the IHCA-related in-hospital mortality between sepsis and non-sepsis groups in all patients and subgroups divided by cardiac arrest rhythm and age. Multivariable logistic regression analysis was performed to assess the independent association between sepsis and in-hospital mortality. RESULTS: A total of 357,850 hospitalizations who suffered from IHCA were identified, with sepsis present in 17.6% of patients. IHCA-related in-hospital mortality was 84.8% in sepsis and 68.4% in non-sepsis-related hospitalizations ($p < 0.001$). IHCA-related in-hospital mortality was higher in sepsis than in non-sepsis groups, regardless of age or cardiac arrest rhythms. In multivariable logistic regression analysis, sepsis was significantly associated with higher mortality with an odds ratio of 2.27 (95% confidence interval: 2.07-2.50, $p < 0.001$). CONCLUSION: Sepsis was associated with higher in-hospital cardiac arrest mortality compared to non-sepsis cases, regardless of age and cardiac rhythm.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. Semin Arthritis Rheum. 2023 Oct;62:152229. doi: 10.1016/j.semarthrit.2023.152229. Epub 2023 Jun 19.

Sudden cardiac death, arrhythmias and abnormal electrocardiography in systemic sclerosis: A systematic review and meta-analysis.

Fairley JL(1), Ross L(1), Quinlivan A(1), Hansen D(2), Paratz E(3), Stevens W(1), Kistler PM(4), McLellan A(2), La Gerche A(5), Nikpour M(6).

ABSTRACT

OBJECTIVE: To calculate the frequency of sudden cardiac death(SCD), arrhythmia and conduction defects in SSc. METHODS: MEDLINE/EMBASE were searched to January 2023. English-language studies reporting the incidence/frequency of SCD, arrhythmia and electrocardiography(ECG) abnormalities in SSc were included. Odds ratios(OR), estimations of annual incidence or pooled frequencies were calculated. RESULTS: Seventy-nine studies(n = 13,609 participants with SSc) were included in the meta-analysis. Methodology and outcomes were heterogeneous. Ten studies included cohorts with known/suspected SSc-associated heart involvement(SHI), generally defined as clinically-manifest cardiac disease/abnormal cardiac investigations. The incidence of SCD in SHI was estimated to be 3.3% annually(n = 4 studies, 301PY follow-up). On ambulatory ECG, 18% of SHI cohorts had non-sustained ventricular tachycardia(NSVT; n = 4, 95%CI3.2-39.3%), 70% frequent premature ventricular complexes (PVCs; n = 1, 95%CI34.8-93.3%), and 8% atrial fibrillation (AF; n = 1, 95%CI4.2-13.6%). Nineteen studies included participants without SHI, defined as normal cardiac investigations/absence of cardiac disease. The estimated incidence of SCD was approximately 2.9% annually (n = 1, 67.5PY). Compared to healthy controls, individuals without SHI demonstrated NSVT 13.3-times more frequently (n = 2, 95%CI2-102), and paroxysmal supraventricular tachycardia 7-times more frequently (n = 4, 95%CI3-15). Other ambulatory ECG abnormalities included NSVT in 9% (n = 7, 95%CI6-14%), >1000 PVCs/24 h in 6% (n = 2, 95%CI1-13%), and AF in 7% (n = 5, 0-21%). Fifty studies included general SSc cohorts unselected for cardiac disease. The incidence of SCD was estimated to be 2.0% annually(n = 4 studies, 1646PY). Unselected SSc cohorts were 10.5-times more likely to demonstrate frequent PVCs (n = 2, 95%CI 2-59) and 2.5-times more likely to have an abnormal electrocardiography (n = 2, 95%CI1-4). CONCLUSIONS: The incidence of SCD in SSc is estimated to be 1.0-3.3% annually, at least 10-fold higher than general population estimates. Arrhythmias including NSVT and frequent PVCs appear common, including amongst those without known/suspected SHI.

END-TIDAL CO_2

No articles identified.

ORGAN DONATION

No articles identified.

FEEDBACK

No articles identified.

DRUGS

1. Prehosp Emerg Care. 2023 Aug 29:1-15. doi: 10.1080/10903127.2023.2252500. Online ahead of print.

Prehospital Administration of Norepinephrine and Epinephrine for Shock after Resuscitation from Cardiac Arrest.

Wender ER(1), Counts CR(1)(2), Van Dyke M(1), Sayre MR(1)(2), Maynard C(3), Johnson NJ(1).

ABSTRACT

INTRODUCTION: Shock after resuscitation from out-of-hospital cardiac arrest (OHCA) is often treated with vasopressors. We examined whether infusion of epinephrine versus norepinephrine was associated with prehospital rearrest and neurologically favorable survival among OHCA patients. METHODS: This retrospective study included OHCA cases in Seattle, WA from 2014-2021 who had return of spontaneous circulation (ROSC) followed by vasopressor infusion. Our primary exposure was infusion of epinephrine or norepinephrine. Our primary outcome was prehospital rearrest. Secondary outcomes included survival and neurologically favorable outcome (Cerebral Performance Category score of 1 or 2). We used multivariable logistic regression to test associations between exposures and outcomes adjusting for key covariates. RESULTS: Of 451 OHCA patients with ROSC followed by vasopressor infusion, 253 (56%) received norepinephrine and 198 (44%) received epinephrine infusions. Those who received epinephrine were older (median 66 [IQR 53-79] vs 63 [IQR 47-75] years), but otherwise had similar baseline characteristics. Patients who received epinephrine were twice as likely to rearrest (55% vs 25%). After adjustment, the difference in rearrest rates between epinephrine and norepinephrine persisted (OR 3.28, 95% CI 2.25-5.08), and the odds of pulses at hospital arrival were lower in the epinephrine group (OR 0.52 95% CI 0.32-0.83). After adjustment, there was no difference in neurologically favorable survival, survival to hospital admission, or survival to discharge. CONCLUSION: Patients who received epinephrine infusions after ROSC suffered prehospital rearrest more frequently than those who received norepinephrine. Survival and neurological status at hospital discharge were similar. Future trials should examine the optimal approach to hemodynamic management for post-OHCA shock.

TRAUMA

No articles identified.

VENTILATION

1. Am J Emerg Med. 2023 Aug 16;73:116-124. doi: 10.1016/j.ajem.2023.08.028. Online ahead of print.

Video laryngoscopy and direct laryngoscopy for cardiac arrest: A meta-analysis of clinical studies and trials.

Chien YT(1), Ong JR(2), Tam KW(3), Loh EW(4).

ABSTRACT

BACKGROUND: Intubation is an essential procedure in cardiopulmonary resuscitation (CPR). We conducted a systematic review and meta-analysis of trials and studies comparing the performance of video laryngoscope (VL) and direct laryngoscope (DL) in endotracheal intubation (ETI) during CPR in cardiac arrest (OHCA) patients. METHODS: We searched the PUBMED, EMBASE, and Cochrane library databases. We analyzed the first-pass success rate, total intubation time, Cormack-Lehane grade (CL grade), esophageal intubation rate, and dental injury rate among the in-hospital cardiac arrest (IHCA) patients or out-of-hospital cardiac arrest (OHCA) patients. We demonstrated the pooled results of continuous outcomes by mean difference (MD) and dichotomous outcomes by odds ratio (OR), with a 95% confidence interval (CI) using a random-effects model. RESULTS: We obtained six observational studies and one randomized control trial. The pooled results showed a significant increase in first-pass success rate (OR: 1.86, 95% CI: 1.41, 2.47), Cormack-Lehane (CL) grade (OR: 2.01, 95% CI: 1.59,2.53), and a decrease of esophageal intubation rate (OR: 0.25, 95% CI: 0.08, 0.85) in the VL group compared with DL group. Also, a non-significant decrease in dental injury rate [OR: 0.23, 95% CI: 0.05, 1.08) was observed in the VL group compared with the DL group. There was no statistical difference between the VL and DL groups, although the VL group seemed to have a shorter total intubation time (MD: -15.43, 95% CI: -34.67, 3.81). Types of laryngoscopes were not associated with the rate of ROSC [OR 1.01 (0.95,1.07); P = 0.83]. No differences in survival outcomes were observed between the two approaches. CONCLUSIONS: Compared to DL, VL was found to be associated with first-pass success and CL grade. We recommend prioritizing VL over DL when performing ETIs for patients with cardiac arrest.

CERERBRAL MONITORING

1. Eur Heart J Open. 2023 Aug 28;3(4):oead078. doi: 10.1093/ehjopen/oead078. eCollection 2023 Jul.

Predicting poor neurological outcomes following out-of-hospital cardiac arrest using neuron-specific enolase and neurofilament light chain in patients with and without haemolysis.

Abdi Isse Y(1), Frikke-Schmidt R(2)(3), Wiberg S(1), Grand J(1), Obling LER(1), Meyer ASP(1), Kjaergaard J(1)(3), Hassager C(1)(3), Meyer MAS(1).

ABSTRACT

AIMS: Hypoxic-ischaemic brain injury following out-of-hospital cardiac arrest (OHCA) is a common complication and a major cause of death. Neuron-specific enolase (NSE) and neurofilament light chain (NfL) are released after brain injury and elevated concentrations of both are associated with poor neurological outcome. We explored the influence of haemolysis on the prognostic performance of NSE and NfL. METHODS AND RESULTS: The study is based on post hoc analyses of a randomized, single-centre, double-blinded, controlled trial (IMICA), where comatose OHCA patients of presumed cardiac cause were included. Free-haemoglobin was measured at admission to quantify haemolysis. NSE and NfL were measured after 48 h to estimate the extent of brain injury. Montreal Cognitive Assessment score (MoCA) was assessed to evaluate neurocognitive impairments. Seventy-three patients were included and divided into two groups by the median free-haemoglobin at admission. No group differences in mortality or poor neurological outcome were observed. The high-admission free-haemoglobin group had a significantly higher concentration of NSE compared to the low-admission free-haemoglobin group (27.4 µmol/L vs. 19.6 µmol/L, P = 0.03), but no differences in NfL. The performance of NSE and NfL in predicting poor neurological outcome were high for both, but NfL was numerically higher [area under the ROC (AUROC) 0.90 vs. 0.96, P = 0.09]. Furthermore, NfL, but not NSE, was inversely correlated with MoCA score, R2 = 0.21, P = 0.006. CONCLUSION: High free-haemoglobin at admission was associated with higher NSE concentration after 48 h, but, the performance of NSE and NfL in predicting poor neurological outcome among OHCA patients were

good regardless of early haemolysis. Only elevated NfL concentrations were associated with cognitive impairments.

2. Neurology. 2023 Aug 29;101(9):e940-e952. doi: 10.1212/WNL.0000000000207537. Epub 2023 Jul 6.

Neurophysiology State Dynamics Underlying Acute Neurologic Recovery After Cardiac Arrest.

Amorim E(1), Zheng WL(2), Jing J(2), Ghassemi MM(2), Lee JW(2), Wu O(2), Herman ST(2), Pang T(2), Sivaraju A(2), Gaspard N(2), Hirsch L(2), Ruijter BJ(2), Tjepkema-Cloostermans MC(2), Hofmeijer J(2), van Putten MJAM(2), Westover MB(2).

ABSTRACT

BACKGROUND AND OBJECTIVES: Epileptiform activity and burst suppression are neurophysiology signatures reflective of severe brain injury after cardiac arrest. We aimed to delineate the evolution of coma neurophysiology feature ensembles associated with recovery from coma after cardiac arrest. METHODS: Adults in acute coma after cardiac arrest were included in a retrospective database involving 7 hospitals. The combination of 3 quantitative EEG features (burst suppression ratio [BSup], spike frequency [SpF], and Shannon entropy [En]) was used to define 5 distinct neurophysiology states: epileptiform high entropy (EHE: SpF ≥4 per minute and En ≥5); epileptiform low entropy (ELE: SpF ≥4 per minute and <5 En); nonepileptiform high entropy (NEHE: SpF <4 per minute and ≥5 En); nonepileptiform low entropy (NELE: SpF <4 per minute and <5 En), and burst suppression (BSup ≥50% and SpF <4 per minute). State transitions were measured at consecutive 6-hour blocks between 6 and 84 hours after return of spontaneous circulation. Good neurologic outcome was defined as best cerebral performance category 1-2 at 3-6 months. RESULTS: One thousand thirty-eight individuals were included (50,224 hours of EEG), and 373 (36%) had good outcome. Individuals with EHE state had a 29% rate of good outcome, while those with ELE had 11%. Transitions out of an EHE or BSup state to an NEHE state were associated with good outcome (45% and 20%, respectively). No individuals with ELE state lasting >15 hours had good recovery. DISCUSSION: Transition to high entropy states is associated with an increased likelihood of good outcome despite preceding epileptiform or burst suppression states. High entropy may reflect mechanisms of resilience to hypoxic-ischemic brain injury.

3. Eur Heart J Acute Cardiovasc Care. 2023 Aug 24;12(8):548-549. doi: 10.1093/ehjacc/zuad056.

Biomarkers for neuroprognostication after out-of-hospital cardiac arrest.

Isse YA(1), Meyer MAS(1), Hassager C(1)(2).

NO ABSTRACT AVAILABLE

ULTRASOUND AND CPR

No articles identified.

ORGANISATION AND TRAINING

1. Int Emerg Nurs. 2023 Aug 30;70:101336. doi: 10.1016/j.ienj.2023.101336. Online ahead of print.

Experience of cardiopulmonary resuscitation by healthcare professionals in emergency departments: A descriptive phenomenological study.

Hao Y(1), Zhu W(2), Wu H(3), Guo Y(4), Mu W(5), Li D(6), Ren X(7), Fan L(8).

ABSTRACT

BACKGROUND: Emergency department healthcare professionals have the most contact with patients in cardiac arrest, and their physical and mental state has a significant impact on the quality

of cardiopulmonary resuscitation and patient outcomes. However, there is limited research discussing the experience of resuscitation by emergency department healthcare professionals. AIM: To explore the experiences of emergency department healthcare professionals in performing cardiopulmonary resuscitation. METHODS: A descriptive phenomenological study. The study used purposive sampling and selected 9 nurses and 6 physicians from the emergency departments of four general hospitals of different levels in western China between May 2022 and October 2022. Semi-structured interview guides and face-to-face interviews were used to collect information. Colaizzi analysis was used to analyze the data. RESULTS: The study identified 3 themes and 11 sub-themes. These themes and sub-themes include 1) emotional experience (A sense of achievement, A sense of powerlessness and trauma, Stress, Empathy, Psychological resilience strengthens), 2) cognitive growth (Understanding CPR rationally, Increasing concern for personal and family health, Mastering self-relaxation methods), and 3) the desire for continued development (Seeking professional development, Hoping for professional psychological assistance, Strengthening team support). CONCLUSIONS: The experience of performing cardiopulmonary resuscitation by healthcare professionals in emergency departments is dynamic, with changes in mood and cognitive growth. Managers in hospitals should pay attention to their experiences and need at different stages of career development and actively carry out targeted cognitive guidance, skills training, and psychological support to help them achieve professional development and physical and mental health. At the same time, to promote the development of CPR for all, it is recommended that the authorities actively improve the public infrastructure for first aid and related policy protection.

2. Am J Crit Care. 2023 Sep 1;32(5):381-386. doi: 10.4037/ajcc2023772.
Residual Psychomotor Skills of Orderlies After a Novel Chest Compression Training Intervention.
Voizard P(1), Vincelette C(2), Carrier FM(3), Sokoloff C(4).
ABSTRACT
BACKGROUND: High-quality chest compressions are essential to favorable patient outcomes after in-hospital cardiac arrest. Without frequent training, however, skill in performing compressions declines considerably. The Timely Chest Compression Training (T-CCT) intervention was introduced in 2019 as a quality improvement initiative to address this problem. The long-term impact of the T-CCT is unknown. METHODS: A cohort study was conducted at a university-affiliated hospital in Quebec, Canada. Chest compression performance among orderlies was measured by using a subtractive scoring model and mannequins. The association of exposure to the T-CCT 10 months earlier with having an excellent chest compression performance (score ≥90 out of 100), after adjusting for potential confounders, was examined. RESULTS: A total of 412 orderlies participated in the study. More than half (n = 232, 56%) had been exposed to the T-CCT, and the rest (n = 180, 44%) had not. Nearly half (n = 106, 46%) of orderlies exposed to the T-CCT had an excellent performance, compared with less than one-third (n = 53, 30%) of nonexposed orderlies. In univariable analysis, previous exposure to the T-CCT was associated with 1.53 times greater risk of having an excellent performance (risk ratio, 1.53; 95% CI, 1.17-1.99). This effect remained after adjustment for potential confounders (risk ratio, 1.57; 95% CI, 1.19-2.07). CONCLUSION: The results of this study suggest that the T-CCT has a lasting effect on the psychomotor skills of orderlies 10 months after initial exposure. Further research should investigate the impact of the intervention on patient outcomes after in-hospital cardiac arrest.

3. Glob Heart. 2023 Aug 25;18(1):46. doi: 10.5334/gh.1255. eCollection 2023.
Factors and Barriers on Cardiopulmonary Resuscitation and Automated External Defibrillator Willingness to Use among the Community: A 2016-2021 Systematic Review and Data Synthesis.
Daud A(1), Nawi AM(1), Aizuddin AN(1), Yahya MF(2).

ABSTRACT
BACKGROUND: Bystander cardiopulmonary resuscitation (CPR) and using an automated external defibrillator (AED) can improve out-of-hospital cardiac arrest survival. However, bystander CPR and AED rates remained consistently low. The goal of this systematic review was to assess factors influencing community willingness to perform CPR and use an AED for out-of-hospital cardiac arrest survival (OHCA) victims, as well as its barriers. METHODS: The review processes (PROSPERO: CRD42021257851) were conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) review protocol; formulation of review questions; systematic search strategy based on identification, screening, and eligibility using established databases including Scopus, Web of Science, and Medline Complete via EBSCOhost; quality appraisal; and data extraction and analysis. There is identification of full-text journal articles that were published between 2016 and 2021 and written in English. RESULTS: Of the final 13 articles, there are six identified factors associated with willingness to perform CPR and use an AED, including socio-demographics, training, attitudes, perceived norms, self-efficacy, and legal obligation. Younger age, men, higher level of education, employed, married, having trained in CPR and AED in the previous 5 years, having received CPR education on four or more occasions, having a positive attitude and perception toward CPR and AED, having confidence to perform CPR and to apply an AED, and legal liability protection under emergency medical service law were reasons why one would be more likely to indicate a willingness to perform CPR and use an AED. The most reported barriers were fear of litigation and injuring a victim. CONCLUSIONS: There is a need to empower all the contributing factors and reduce the barrier by emphasizing the importance of CPR and AEDs. The role played by all stakeholders should be strengthened to ensure the success of intervention programs, and indirectly, that can reduce morbidity and mortality among the community from OHCA.

4. Lancet. 2023 Aug 25:S0140-6736(23)01351-X. doi: 10.1016/S0140-6736(23)01351-X. Online ahead of print.

Expedited transfer to a cardiac arrest centre for non-ST-elevation out-of-hospital cardiac arrest (ARREST): a UK prospective, multicentre, parallel, randomised clinical trial.

Patterson T(1), Perkins GD(2), Perkins A(3), Clayton T(3), Evans R(3), Dodd M(3), Robertson S(3), Wilson K(4), Mellett-Smith A(5), Fothergill RT(6), McCrone P(7), Dalby M(8), MacCarthy P(9), Firoozi S(10), Malik I(11), Rakhit R(12), Jain A(13), Nolan JP(14), Redwood SR(15); ARREST trial collaborators.

ABSTRACT
BACKGROUND: The International Liaison Committee on Resuscitation has called for a randomised trial of delivery to a cardiac arrest centre. We aimed to assess whether expedited delivery to a cardiac arrest centre compared with current standard of care following resuscitated cardiac arrest reduces deaths. METHODS: ARREST is a prospective, parallel, multicentre, open-label, randomised superiority trial. Patients (aged ≥18 years) with return of spontaneous circulation following out-of-hospital cardiac arrest without ST elevation were randomly assigned (1:1) at the scene of their cardiac arrest by London Ambulance Service staff using a secure online randomisation system to expedited delivery to the cardiac catheter laboratory at one of seven cardiac arrest centres or standard of care with delivery to the geographically closest emergency department at one of 32 hospitals in London, UK. Masking of the ambulance staff who delivered the interventions and those reporting treatment outcomes in hospital was not possible. The primary outcome was all-cause mortality at 30 days, analysed in the intention-to-treat (ITT) population excluding those with unknown mortality status. Safety outcomes were analysed in the ITT population. The trial was prospectively registered with the International Standard Randomised Controlled Trials Registry, 96585404. FINDINGS: Between Jan 15, 2018, and Dec 1, 2022, 862 patients were enrolled, of whom 431 (50%) were randomly assigned to a cardiac arrest centre and 431 (50%) to standard care. 20

participants withdrew from the cardiac arrest centre group and 19 from the standard care group, due to lack of consent or unknown mortality status, leaving 411 participants in the cardiac arrest centre group and 412 in the standard care group for the primary analysis. Of 822 participants for whom data were available, 560 (68%) were male and 262 (32%) were female. The primary endpoint of 30-day mortality occurred in 258 (63%) of 411 participants in the cardiac arrest centre group and in 258 (63%) of 412 in the standard care group (unadjusted risk ratio for survival 1·00, 95% CI 0·90-1·11; p=0·96). Eight (2%) of 414 patients in the cardiac arrest centre group and three (1%) of 413 in the standard care group had serious adverse events, none of which were deemed related to the trial intervention. INTERPRETATION: In adult patients without ST elevation, transfer to a cardiac arrest centre following resuscitated cardiac arrest in the community did not reduce deaths.

5. Heart. 2023 Aug 28:heartjnl-2023-322985. doi: 10.1136/heartjnl-2023-322985. Online ahead of print.

Automated external defibrillator location and socioeconomic deprivation in Great Britain.

Burgoine T(1), Austin D(2)(3), Wu J(4), Quinn T(5), Shurmer P(6), Gale CP(7)(8), Wilkinson C(9)(10).

ABSTRACT

OBJECTIVE: The early use of automated external defibrillators (AEDs) improves outcomes in out-of-hospital cardiac arrest (OHCA). We investigated AED access across Great Britain (GB) according to socioeconomic deprivation. METHODS: Cross-sectional observational study using AED location data from The Circuit: the national defibrillator network led by the British Heart Foundation in partnership with the Association of Ambulance Chief Executives, Resuscitation Council UK and St John Ambulance. We calculated street network distances between all 1 677 466 postcodes in GB and the nearest AED and used a multilevel linear mixed regression model to investigate associations between the distances from each postcode to the nearest AED and Index of Multiple Deprivation, stratified by country and according to 24 hours 7 days a week (24/7) access. RESULTS: 78 425 AED locations were included. Across GB, the median distance from the centre of a postcode to an AED was 726 m (England: 739 m, Scotland: 743 m, Wales: 512 m). For 24/7 access AEDs, the median distances were further (991 m, 994 m, 570 m). In Wales, the average distance to the nearest AED and 24/7 AED was shorter for the most deprived communities. In England, the average distance to the nearest AED was also shorter in the most deprived areas. There was no association between deprivation and average distance to the nearest AED in Scotland. However, the distance to the nearest 24/7 AED was greater with increased deprivation in England and Scotland. On average, a 24/7 AED was in England and Scotland, respectively, 99.2 m and 317.1 m further away in the most deprived than least deprived communities. CONCLUSION: In England and Scotland, there are differences in distances to the nearest 24/7 accessible AED between the most and least deprived communities. Equitable access to 'out-of-hours' accessible AEDs may improve outcomes for people with OHCA.

6. Resusc Plus. 2023 Aug 11;15:100449. doi: 10.1016/j.resplu.2023.100449. eCollection 2023 Sep.

Out of sight - Out of mind? The need for a professional and standardized peri-mission first responder support model.

Schnaubelt S(1)(2)(3)(4), Orlob S(3)(5)(6), Veigl C(1)(2), Sulzgruber P(2)(7), Krammel M(2)(8), Lauridsen KG(9)(10)(11), Greif R(12)(13).

ABSTRACT

First responders are an essential part of the chain (-mail) of survival as they bridge and reduce the time to first chest compressions and defibrillation substantially. However, in the peri-mission phase before and after being sent to a cardiac arrest, these first responders are in danger of being forgotten and taken for granted, and the potential psychological impact has to be remembered. We

propose a standardized first responder support system (FRSS) that needs to ensure that first responders are valued and cared for in terms of psychological safety and continuing motivation. This multi-tiered program should involve tailored education and standardized debriefing, as well as actively seeking contact with the first responders after their missions to facilitate potentially needed professional psychological support.

7. Resuscitation. 2023 Aug 25:109946. doi: 10.1016/j.resuscitation.2023.109946. Online ahead of print.

Mortality and Healthcare Resource Utilisation After Cardiac Arrest in the United States - A 10-Year Nationwide Analysis Prior to the COVID-19 Pandemic.

Thevathasan T(1), Paul J(2), Gaul AL(2), Degbeon S(2), Füreder L(2), Dischl D(2), Knie W(2), Girke G(2), Wurster T(2), Landmesser U(3), Skurk C(4).

ABSTRACT

AIM: Understanding the public health burden of cardiac arrest (CA) is important to inform healthcare policies, particularly during health care crises such as the COVID-19 pandemic. This study aimed to analyse outcomes of in-hospital mortality and healthcare resource utilisation in adult patients with CA in the United States over the last decade prior to the COVID-19 pandemic. METHODS: The United States (US) National Inpatient Sample was utilised to identify hospitalised adult patients with CA between 2010 and 2019. Logistic and Poisson regression models were used to analyse outcomes by adjusting for 47 confounders. RESULTS: 248,754 adult patients with CA (without "Do Not Resuscitate"-orders) were included in this study, out of which 57.5% were male. In-hospital mortality was high with 51.2% but improved significantly from 58.3% in 2010 to 46.4% in 2019 (P<0.001). Particularly, elderly patients, non-white patients and patients requiring complex therapy had a higher mortality rate. Although the average hospital LOS decreased by 11%, hospital expenses have increased by 13% between 2010 and 2019 (each P<0.001), presumably due to more frequent use of mechanical circulatory support (MCS, e.g. ECMO from 2.6% to 8.7% or Impella® micro-axial flow pump from 1.8% to 14.2%). Strong disparities existed among patient age groups and ethnicities across the US. Of note, the number of young adults with CA and opioid-induced CA has almost doubled within the study period. CONCLUSION: Over the last ten years prior to the COVID-19 pandemic, CA-related survival has incrementally improved with shorter hospitalisations and increased medical expenses, while strong disparities existed among different age groups and ethnicities. National standards for CA surveillance should be considered to identify trends and differences in CA treatment to allow for standardised medical care.

8. Resusc Plus. 2023 Aug 24;15:100448. doi: 10.1016/j.resplu.2023.100448. eCollection 2023 Sep.

Evaluation of junior doctors' retention of knowledge and skills after simulation training in shockable rhythm cardiac arrest in a low-resource setting in Nepal.

Shrestha R(1), Indrasena BSH(2)(3), Subedi P(4)(5), Lamsal D(6), Moulton C(7), Aylott J(2)(5).

ABSTRACT

AIMS: To test junior doctors' abilities to retain advanced life support psychomotor skills and theoretical knowledge in management of shockable rhythm cardiac arrest. METHODS: A repeated measure pre-post study design was used with 43 junior doctors, recruited after notifying them with robust method of attraction through flyers, brochures, email and phone calls. Written and performance tests, initial pre-test, immediate post-training, 30-days post-training and 60-days post-training, using simulation-based scenarios with a low-fidelity manikin were used with recording performance of ALS. INSTRUMENTATION: Resuscitation Council UK ALS algorithms and guidelines1 were used in a simulated testing environment. RESULTS: There was a highly significant improvement in knowledge immediately after training ($p < 0.00$), with a net gain of marks from a mean value of

63.2% before training to 87.7% after training by 24.5% (95% CI 19.4, 29.6).There was a gradual decline of retained knowledge with time from immediate post-training over, 30-days and 60-days post-training (p < 0.00). The simulation pre-training assessments and immediate post-training assessments results were statistically significant (p < .00). The mean difference was 44.1% (95% CI 50.11, 38.10). There was a statistically significant decline of the competency with time (p < .00). Unlike for the knowledge test, the drop was significant on the 30th day (p < .00) with a mean difference of -10.5% (95% CI -13.55, -7.40). CONCLUSION: The training of junior doctors in shockable rhythm cardiac arrest in a low resource setting, improved knowledge and skills in the participants after training. However, retention of knowledge declined at 30 days and more significantly after 60 days and retention of skill was declined more significantly at 30 days.

9. Lancet. 2023 Aug 24:S0140-6736(23)00875-9. doi: 10.1016/S0140-6736(23)00875-9. Online ahead of print.

The Lancet Commission to reduce the global burden of sudden cardiac death: a call for multidisciplinary action.

Marijon E(1), Narayanan K(2), Smith K(3), Barra S(4), Basso C(5), Blom MT(6), Crotti L(7), D'Avila A(8), Deo R(9), Dumas F(10), Dzudie A(11), Farrugia A(12), Greeley K(13), Hindricks G(14), Hua W(15), Ingles J(16), Iwami T(17), Junttila J(18), Koster RW(19), Le Polain De Waroux JB(20), Olasveengen TM(21), Ong MEH(22), Papadakis M(23), Sasson C(24), Shin SD(25), Tse HF(26), Tseng Z(27), Van Der Werf C(28), Folke F(29), Albert CM(30), Winkel BG(31).

ABSTRACT

Despite major advancements in cardiovascular medicine, sudden cardiac death (SCD) continues to be an enormous medical and societal challenge, claiming millions of lives every year. Efforts to prevent SCD are hampered by imperfect risk prediction and inadequate solutions to specifically address arrhythmogenesis. Although resuscitation strategies have witnessed substantial evolution, there is a need to strengthen the organisation of community interventions and emergency medical systems across varied locations and health-care structures. With all the technological and medical advances of the 21st century, the fact that survival from sudden cardiac arrest (SCA) remains lower than 10% in most parts of the world is unacceptable. Recognising this urgent need, the Lancet Commission on SCD was constituted, bringing together 30 international experts in varied disciplines. Consistent progress in tackling SCD will require a completely revamped approach to SCD prevention, with wide-sweeping policy changes that will empower the development of both governmental and community-based programmes to maximise survival from SCA, and to comprehensively attend to survivors and decedents' families after the event. International collaborative efforts that maximally leverage and connect the expertise of various research organisations will need to be prioritised to properly address identified gaps. The Commission places substantial emphasis on the need to develop a multidisciplinary strategy that encompasses all aspects of SCD prevention and treatment. The Commission provides a critical assessment of the current scientific efforts in the field, and puts forth key recommendations to challenge, activate, and intensify efforts by both the scientific and global community with new directions, research, and innovation to reduce the burden of SCD worldwide.

10. Heart. 2023 Aug 24;109(18):1363-1371. doi: 10.1136/heartjnl-2021-320559.

One-year quality-of-life outcomes of cardiac arrest survivors by initial defibrillation provider.

Haskins B(1)(2), Nehme Z(3)(4)(5), Andrew E(3)(5), Bernard S(3), Cameron P(3)(6), Smith K(3)(5).

ABSTRACT

OBJECTIVE: To assess the long-term functional and health-related quality-of-life (HRQoL) outcomes for out-of-hospital cardiac arrest (OHCA) survivors stratified by initial defibrillation provider.

METHODS: This retrospective study included adult non-traumatic OHCA with initial shockable rhythms between 2010 and 2019. Survivors at 12 months after arrest were invited to participate in structured telephone interviews. Outcomes were identified using the Glasgow Outcome Scale-Extended (GOS-E), EuroQol-5 Dimension (EQ-5D), 12-Item Short Form Health Survey and living and work status-related questions. RESULTS: 6050 patients had initial shockable rhythms, 3211 (53.1%) had a pulse on hospital arrival, while 1879 (31.1%) were discharged alive. Bystander defibrillation using the closest automated external defibrillator had the highest survival rate (52.8%), followed by dispatched first responders (36.7%) and paramedics (27.9%). 1802 (29.8%) patients survived to 12-month postarrest; of these 1520 (84.4%) were interviewed. 1088 (71.6%) were initially shocked by paramedics, 271 (17.8%) by first responders and 161 (10.6%) by bystanders. Bystander-shocked survivors reported higher rates of living at home without care (87.5%, 75.2%, 77.0%, p<0.001), upper good recovery (GOS-E=8) (41.7%, 30.4%, 30.6%, p=0.002) and EQ-5D visual analogue scale (VAS) ≥80 (64.9%, 55.9%, 52.9%, p=0.003) compared with first responder and paramedics, respectively. After adjustment, initial bystander defibrillation was associated with higher odds of EQ-5D VAS ≥80 (adjusted OR (AOR) 1.56, 95% CI 1.15-2.10; p=0.004), good functional recovery (GOS-E ≥7) (AOR 1.53, 95% CI 1.12-2.11; p=0.009), living at home without care (AOR 1.77, 95% CI 1.16-2.71; p=0.009) and returning to work (AOR 1.72, 95% CI 1.05-2.81; p=0.031) compared with paramedic defibrillation. CONCLUSION: Survivors receiving initial bystander defibrillation reported better functional and HRQoL outcomes at 12 months after arrest compared with those initially defibrillated by paramedics.

11. JAMA Netw Open. 2023 Aug 1;6(8):e2331205. doi: 10.1001/jamanetworkopen.2023.31205.
Quality of Layperson CPR Instructions From Artificial Intelligence Voice Assistants.
Murk W(1), Goralnick E(2)(3), Brownstein JS(3)(4), Landman AB(2)(3).
ABSTRACT
Plain Language Summary: This case series study evaluates responses from 4 artificial intelligence voice assistance on CPR questions from laypersons.

12. Resusc Plus. 2023 Aug 10;15:100439. doi: 10.1016/j.resplu.2023.100439. eCollection 2023 Sep.
Methods to teach schoolchildren how to perform and retain cardiopulmonary resuscitation (CPR) skills: A systematic review and meta-analysis.
Allan KS(1), Mammarella B(2)(3), Visanji M(4), Moglica E(5), Sadeghlo N(6), O'Neil E(7), Chan TT(8), Kishibe T(9), Aves T(1).
ABSTRACT
BACKGROUND: Worldwide, bystander CPR rates are low; one effective way to increase these rates is to train schoolchildren; however, the most effective way to train them is currently unknown. METHODS: This systematic review and meta-analysis of randomized controlled trials (RCTs) and observational studies, evaluated whether CPR training for schoolchildren, using innovative teaching modalities (nonpractical, self, or peer-training) versus standard instructor-led training, resulted in higher quality CPR, self-confidence and short-term (≤3 months post-training) or long-term (>3 months post-training) retention of CPR skills. RESULTS: From 9793 citations, 96 studies published between 1975 and 2022 (44 RCTs and 52 before/after studies) were included. There were 43,754 students, average age of 11.5 ± 0.9 (range 5.9-17.6) and 49.2% male. Only 13 RCTs compared practical vs. nonpractical training (n = 5), self- vs. instructor-led training (n = 7) or peer- vs. instructor-led training (n = 5). The observed statistically significant differences in mean depth and rate of compressions between children with hands-on practical training and those without were not clinically relevant. Regardless of training modality, compression depth was consistently suboptimal.

No differences were observed in CPR skills immediately or ≤ 3 months post-training, between children who were self- or peer-trained vs. instructor-led. Due to lack of data, we were unable to evaluate the impact of these novel training modalities on student self-confidence. CONCLUSION: Although innovative training modalities are equally effective to instructor-led training when teaching schoolchildren CPR, compression depth was frequently suboptimal. Recommendations on standardized training and evaluation methods are necessary to understand the best ways to train children.

POST-CARDIAC ARREST TREATMENTS

1. Am J Cardiol. 2023 Aug 29;205:379-386. doi: 10.1016/j.amjcard.2023.07.163. Online ahead of print.
Effectiveness of Emergency versus Nonemergent Coronary Angiography After Out-of-Hospital Cardiac Arrest without ST-Segment Elevation: A Systematic Review and Meta-Analysis of Randomized Controlled Trials.
Shoaib A(1), Salim N(1), Shahid AR(2), Amir MA(2), Shiraz MI(2), Ayaz A(1), Khan BS(2), Ansari SA(3), Suheb MK(4), Merza N(5), Shahid I(6).
ABSTRACT
The optimal timing of coronary angiography (CAG) in patients after out-of-hospital cardiac arrest (OHCA) without ST-segment elevation remains controversial. Therefore, we conducted a meta-analysis of randomized control trials to investigate the effectiveness of emergency CAG versus delayed CAG in OHCA patients with a non-ST-segment elevated rhythm. PubMed, Scopus, CINAHL, Cochrane CENTRAL, and JBI databases were searched from inception to September 7, 2022. Our primary end point was survival with a good neurological outcome, whereas the secondary outcomes included short-term survival, mid-term survival, recurrent arrhythmias, myocardial infarction after hospitalization, major bleeding, acute kidney injury, and left ventricular ejection fraction. Nine randomized control trials involving 2,569 patients were included in this analysis. Our meta-analysis showed no significant difference in the improvement of neurological outcome (RR 0.96, 95% Confidence Interval [CI] [0.87, 1.06]), short-term survival (risk ratio [RR] 0.98, 95% CI [0.89, 1.08]), mid-term survival (RR 0.98, 95% CI [0.87, 1.10]), recurrent arrhythmias (RR 1.02, 95% CI [0.50, 2.06]), myocardial infarction (RR 0.66, 95% CI [0.13, 3.30]), major bleeding (RR 0.96, 95% CI [0.55, 1.69]), acute kidney injury (RR 1.20, 95% CI [0.32, 4.49]) and left ventricular ejection fraction (RR 0.89, 95% CI [0.69, 1.15]) in patients who underwent emergency CAG compared with delayed CAG patients. In conclusion, our analysis revealed that emergency CAG had no prognostic superiority over delayed CAG in patients with OHCA without ST-segment elevation.

2. Eur Heart J Acute Cardiovasc Care. 2023 Aug 24;12(8):513-517. doi: 10.1093/ehjacc/zuad077.
Haemodynamic, oxygenation, and ventilation targets after cardiac arrest: the current ABC of post-cardiac arrest intensive care.
Kjaergaard J(1)(2), Møller JE(1)(3).
NO ABSTRACT AVAILABLE

3. J Physiol. 2023 Aug 28. doi: 10.1113/JP284588. Online ahead of print.
Neuroinflammation and the immune system in hypoxic ischaemic brain injury pathophysiology after cardiac arrest.
Sekhon MS(1)(2)(3)(4), Stukas S(2)(4)(5), Hirsch-Reinshagen V(2)(3)(4)(5), Thiara S(1)(4), Schoenthal T(1)(4), Tymko M(1)(4), McNagny KM(6)(7), Wellington C(2)(3)(4)(5), Hoiland R(1)(4).
ABSTRACT

Hypoxic ischaemic brain injury after resuscitation from cardiac arrest is associated with dismal clinical outcomes. To date, most clinical interventions have been geared towards the restoration of cerebral oxygen delivery after resuscitation; however, outcomes in clinical trials are disappointing. Therefore, alternative disease mechanism(s) are likely to be at play, of which the response of the innate immune system to sterile injured tissue in vivo after reperfusion has garnered significant interest. The innate immune system is composed of three pillars: (i) cytokines and signalling molecules; (ii) leucocyte migration and activation; and (iii) the complement cascade. In animal models of hypoxic ischaemic brain injury, pro-inflammatory cytokines are central to propagation of the response of the innate immune system to cerebral ischaemia-reperfusion. In particular, interleukin-1 beta and downstream signalling can result in direct neural injury that culminates in cell death, termed pyroptosis. Leucocyte chemotaxis and activation are central to the in vivo response to cerebral ischaemia-reperfusion. Both parenchymal microglial activation and possible infiltration of peripherally circulating monocytes might account for exacerbation of an immunopathological response in humans. Finally, activation of the complement cascade intersects with multiple aspects of the innate immune response by facilitating leucocyte activation, further cytokine release and endothelial activation. To date, large studies of immunomodulatory therapies have not been conducted; however, lessons learned from historical studies using therapeutic hypothermia in humans suggest that quelling an immunopathological response might be efficacious. Future work should delineate the precise pathways involved in vivo in humans to target specific signalling molecules.

TARGETED TEMPERATURE MANAGEMENT

1. Resuscitation. 2023 Aug 25:109949. doi: 10.1016/j.resuscitation.2023.109949. Online ahead of print.

Comparison of four clinical risk scores in comatose patients after out-of-hospital cardiac arrest.

Schmidbauer S(1), Rylander C(2), Cariou A(3), Wise MP(4), Thomas M(5), Keeble TR(6), Erlinge D(7), Haenggi M(8), Wendel-Garcia PD(9), Bělohlávek J(10), Morten Grejs A(11), Nielsen N(12), Friberg H(13), Dankiewicz J(7).

ABSTRACT

BACKGROUND AND AIMS: Several different scoring systems for early risk stratification after out-of-hospital cardiac arrest have been developed, but few have been validated in large datasets. The aim of the present study was to compare the well-validated Out-of-hospital Cardiac Arrest (OHCA) and Cardiac Arrest Hospital Prognosis (CAHP)-scores to the less complex MIRACLE2- and Target Temperature Management (TTM)-scores. METHODS: This was a post-hoc analysis of the Targeted Hypothermia versus Targeted Normothermia after Out-of-Hospital Cardiac Arrest (TTM2) trial. Missing data were handled by multiple imputation. The primary outcome was discriminatory performance assessed as the area under the receiver operating characteristics-curve (AUROC), with the outcome of interest being poor functional outcome or death (modified Rankin Scale 4-6) at 6 months after OHCA. RESULTS: Data on functional outcome at 6 months were available for 1829 cases, which constituted the study population. The pooled AUROC for the MIRACLE2-score was 0.810 (95% CI 0.790 - 0.828), 0.835 (95% CI 0.816 - 0.852) for the TTM-score, 0.820 (95% CI 0.800 - 0.839) for the CAHP-score and 0.770 (95% CI 0.748 - 0.791) for the OHCA-score. At the cut-offs needed to achieve specificities >95%, sensitivities were <40 % for all four scoring systems. CONCLUSIONS: The TTM-, MIRACLE2- and CAHP-scores are all capable of providing objective risk estimates accurate enough to be used as part of a holistic patient assessment after OHCA of a suspected cardiac origin. Due to its simplicity, the MIRACLE2-score could be a practical solution for both clinical application and risk stratification within trials.

2. Eur Heart J Acute Cardiovasc Care. 2023 Aug 24;12(8):504-506. doi: 10.1093/ehjacc/zuad088.
Temperature management after cardiac arrest: what is next after the TTM-2 and BOX trials?
Taccone FS(1), Annoni F(1).
NO ABSTRACT AVAILABLE

3. Eur Heart J Acute Cardiovasc Care. 2023 Aug 24;12(8):518-524. doi: 10.1093/ehjacc/zuad087.
Sedation and shivering management after cardiac arrest.
Geller BJ(1), Maciel CB(2), May TL(3), Jentzer JC(4).
ABSTRACT
Management of sedation and shivering during targeted temperature management (TTM) after cardiac arrest is limited by a dearth of high-quality evidence to guide clinicians. Data from general intensive care unit (ICU) populations can likely be extrapolated to post-cardiac arrest patients, but clinicians should be mindful of key differences that exist between these populations. Most importantly, the goals of sedation after cardiac arrest are distinct from other ICU patients and may also involve suppression of shivering during TTM. Drug metabolism and clearance are altered considerably during TTM when a low goal temperature is used, which can delay accurate neuroprognostication. When neuromuscular blockade is used to prevent shivering, sedation should be deep enough to prevent awareness and providers should be aware that this can mask clinical manifestations of seizures. However, excessively deep or prolonged sedation is associated with complications including delirium, infections, increased duration of ventilatory support, prolonged ICU length of stay, and delays in neuroprognostication. In this manuscript, we review sedation and shivering management best practices in the post-cardiac arrest patient population.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

1. J Neurol. 2023 Aug 28. doi: 10.1007/s00415-023-11951-4. Online ahead of print.
Cortical somatosensory evoked potential amplitudes and clinical outcome after cardiac arrest: a retrospective multicenter study.
Aalberts N(1), Westhall E(2), Johnsen B(3), Hahn K(4), Kenda M(1)(5), Cronberg T(6), Friberg H(7), Preuß S(1), Ploner CJ(1), Storm C(8), Nee J(8), Leithner C(1), Endisch C(9).
ABSTRACT
OBJECTIVE: Bilaterally absent cortical somatosensory evoked potentials (SSEPs) reliably predict poor outcome in comatose cardiac arrest (CA) patients. Cortical SSEP amplitudes are a recent prognostic extension; however, amplitude thresholds, inter-recording, and inter-rater agreement remain uncertain. METHODS: In a retrospective multicenter cohort study, we determined cortical SSEP amplitudes of comatose CA patients using a standardized evaluation pathway. We studied inter-recording agreement in repeated SSEPs and inter-rater agreement by four raters independently determining 100 cortical SSEP amplitudes. Primary outcome was assessed using the cerebral performance category (CPC) upon intensive care unit discharge dichotomized into good (CPC 1-3) and poor outcome (CPC 4-5). RESULTS: Of 706 patients with SSEPs with median 3 days after CA, 277 (39.2%) had good and 429 (60.8%) poor outcome. Of patients with bilaterally absent cortical SSEPs, one (0.8%) survived with CPC 3 and 130 (99.2%) had poor outcome. Otherwise, the lowest cortical SSEP amplitude in good outcome patients was 0.5 μV. 184 (42.9%) of 429 poor outcome patients had lower cortical SSEP amplitudes. In 106 repeated SSEPs, there were 6 (5.7%) with prognostication-relevant changes in SSEP categories. Following a standardized evaluation pathway, inter-rater agreement was almost perfect with a Fleiss' kappa of 0.88. INTERPRETATION: Bilaterally absent and cortical SSEP amplitudes below 0.5 μV predicted poor outcome with high specificity. A standardized evaluation pathway provided high inter-rater and inter-recording agreement. Regain of

consciousness in patients with bilaterally absent cortical SSEPs rarely occurs. High-amplitude cortical SSEP amplitudes likely indicate the absence of severe brain injury.

2. Resuscitation. 2023 Aug 25:109950. doi: 10.1016/j.resuscitation.2023.109950. Online ahead of print.

The Association of Arterial Blood Pressure Waveform-Derived Area Duty Cycle with Intra-arrest Hemodynamics and Cardiac Arrest Outcomes.

Rappold TE Jr(1), Morgan RW(2), Reeder RW(3), Cooper KK(2), Katie Weeks M(2), Widmann NJ(2), Graham K(2), Berg RA(2), Sutton RM(2); ICU-RESUS, the Eunice Kennedy Shriver National Institute of Child Health, Human Development Collaborative Pediatric Critical Care Research Network Investigator Groups.

ABSTRACT

AIM: Develop a novel, physiology-based measurement of duty cycle (Arterial BloodPressure - Area Duty Cycle [ABP-ADC]) and evaluate the association of ABP-ADCwith intra-arrest hemodynamics and patient outcomes. METHODS: This was a secondary retrospective study of prospectively collected datafrom the ICU-RESUS trial (NCT02837497). Invasive arterial waveform data were used to derive ABP-ADC. The primary exposure was ABP-ADC group (<30%; 30-35%;>35%). The primary outcome was systolic blood pressure (sBP). Secondary outcomes included intra-arrest physiologic goals, CPR quality targets, and patient outcomes. Inan exploratory analysis, adjusted splines and receiver operating characteristic (ROC)curves were used to determine an optimal ABP-ADC associated with improvedhemodynamics and outcomes using a multivariable model. RESULTS: Of 1129 CPR events, 273 had evaluable arterial waveform data. Mean age was 2.9 + 4.9 years. Mean ABP-ADC was 32.5% + 5.0%. In univariable analysis, higher ABP-ADC was associated with lower sBP ($p<0.01$) and failing to achieve sBP targets ($p<0.01$). Other intra-arrest physiologic parameters, quality metrics, and patient outcomes were similar across ABP-ADC groups. Using spline / ROC analysis andclinical judgement, the optimal ABP-ADC cut point was set at 33%. On multivariable analysis, sBP was significantly higher (point estimate 13.18 mmHg, CI95 5.30 - 21.07,$p<0.01$) among patients with ABP-ADC <33%. Other intra-arrest physiologic and patient outcomes were similar. CONCLUSIONS: In this multicenter cohort, a lower ABP-ADC was associated with higher sBPs during CPR. Although ABP-ADC was not associated with outcomes, further studies are needed to define the interactions between CPR mechanics and intra-arrest patient physiology.

3. Neurol Res. 2023 Aug 29:1-10. doi: 10.1080/01616412.2023.2252281. Online ahead of print.

Quantitative EEG and brain network analysis: predicting awakening from early coma after cardiopulmonary resuscitation.

Jiang M(1)(2), Niu Z(3), Liu G(1), Huang H(1), Li X(3), Su Y(1).

ABSTRACT

OBJECTIVE: For patients in early coma after cardiopulmonary resuscitation (CPR), quantitative electroencephalogram (EEG) and brain network analysis was performed to identify relevant indicators of awakening. METHODS: A prospective cohort study was conducted on comatose patients after CPR in the neuro-critical care unit. The included patients received clinical evaluation. The bedside high-density (64-lead) EEG monitoring was performed for visual grading and calculation of power spectrum and brain network parameters. A 3-month prognostic assessment was performed and the patients were dichotomized into the awakening group and the unawakening group. RESULTS: A total of 25 patients were included. The awakening group had higher GCS score, more slow wave pattern and reactive EEG than the unawakening group ($P = 0.003$, $P < 0.001$, $P < 0.001$, respectively). Compared with the unawakening group, (1) the awakening group had significantly higher absolute and relative θ power and slow/fast band ratio of the whole brain

(P < 0.05), (2) the awakening group had stronger connection based on coherence, phase synchronization, phase lag index and cross-correlation (P < 0.05), (3) the awakening group had higher small-worldness, clustering coefficient and average path length based on graph theory (P < 0.05). CONCLUSIONS: The power spectrum and brain network characteristics in patients in early coma after CPR have predictive value for recovery.

PEDIATRICS AND CHILDREN

No articles identified.

EXTRACORPOREAL LIFE SUPPORT

1. Dtsch Arztebl Int. 2023 Oct 20;(Forthcoming):arztebl.m2023.0189. doi: 10.3238/arztebl.m2023.0189. Online ahead of print.
Extracorporeal Cardiopulmonary Resuscitation—Evidence and Implications.
Gaisendrees C, Pooth JS, Luehr M, Sabashnikov A, Yannopoulos D, Wahlers T.
ABSTRACT
BACKGROUND: Around the world, survival rates after cardiac arrest range between <14% for inhospital (IHCA) and <10% for out-of-hospital cardiac arrest (OHCA). This situation could potentially be improved by using extracorporeal membrane oxygenation (ECMO) during cardiopulmonary resuscitation (CPR), i.e. by extracorporeal cardiopulmonary resuscitation (ECPR). METHODS: A selective literature search of Pubmed and Embase using the searching string ((ECMO) OR (ECLS)) AND (ECPR)) was carried out in February 2023 to prepare an up-todate review of published trials comparing the outcomes of ECPR with those of conventional CPR. RESULTS: Out of 573 initial results, 12 studies were included in this review, among them three randomized controlled trials comparing ECPR with CPR, involving a total of 420 patients. The survival rates for ECPR ranged from 20% to 43% for OHCA and 20% to 30.4% for IHCA. Most of the publications were associated with a high degree of bias and a low level of evidence. CONCLUSION: ECPR can potentially improve survival rates after cardiac arrest compared to conventional CPR when used in experienced, high-volume centers in highly selected patients (young age, initial shockable rhythm, witnessed cardiac arrest, therapy-refractory high-quality CPR). No general recommendation for the use of ECPR can be issued at present.

2. Eur J Emerg Med. 2023 Oct 1;30(5):309-310. doi: 10.1097/MEJ.0000000000001061. Epub 2023 Aug 9.
Out of hospital extracorporeal cardiopulmonary resuscitation: The physiopathological rationale.
Peris A(1)(2), Bulletti F(2), Lazzeri C(2), Bonizzoli M(2).
NO ABSTRACT AVAILABLE

3. Ann Intensive Care. 2023 Aug 30;13(1):77. doi: 10.1186/s13613-023-01174-1.
Percutaneous cannulation is associated with lower rate of severe neurological complication in femoro-femoral ECPR: results from the Extracorporeal Life Support Organization Registry.
Wang L(#)(1), Li C(#)(1), Hao X(1), Rycus P(2), Tonna JE(3), Alexander P(4), Fan E(5), Wang H(1), Yang F(#)(6), Hou X(#)(7).
ABSTRACT
BACKGROUND: Percutaneous cannulation is now accepted as the first-line strategy for extracorporeal cardiopulmonary resuscitation (ECPR) in adults. However, previous studies comparing percutaneous cannulation to surgical cannulation have been limited by small sample size and single center settings. This study aimed to compare in-hospital outcomes in cardiac arrest (CA) patients

who received femoro-femoral ECPR with percutaneous vs surgical cannulation. METHODS: Adults with refractory CA treated with percutaneous (percutaneous group) or surgical (surgical group) femoro-femoral ECPR between January 2008 and December 2019 were extracted from the international Extracorporeal Life Support Organization registry. The primary outcome was severe neurological complication. Multivariable logistic regression analyses were performed to assess the association between percutaneous cannulation and in-hospital outcomes. RESULTS: Among 3575 patients meeting study inclusion, 2749 (77%) underwent percutaneous cannulation. The proportion of patients undergoing percutaneous cannulation increased from 18% to 89% over the study period ($p < 0.001$ for trend). Severe neurological complication (13% vs 19%; $p < 0.001$) occurred less frequently in the percutaneous group compared to the surgical group. In adjusted analyses, percutaneous cannulation was independently associated with lower rate of severe neurological complication (odds ratio [OR] 0.62; 95% CI 0.46-0.83; $p = 0.002$), similar rates of in-hospital mortality (OR 0.93; 95% CI 0.73-1.17; $p = 0.522$), limb ischemia (OR 0.84; 95% CI 0.58-1.20; $p = 0.341$) and cannulation site bleeding (OR 0.90; 95% CI 0.66-1.22; $p = 0.471$). The comparison of outcomes provided similar results across different levels of center percutaneous experience or center ECPR volume. CONCLUSIONS: Among adults receiving ECPR, percutaneous cannulation was associated with probable lower rate of severe neurological complication, and similar rates of in-hospital mortality, limb ischemia and cannulation site bleeding.

4. Eur J Heart Fail. 2023 Aug 29. doi: 10.1002/ejhf.3014. Online ahead of print.
Early Left Atrial Venting versus Conventional Treatment for Left Ventricular Decompression during Venoarterial Extracorporeal Membrane Oxygenation Support: The EVOLVE-ECMO Randomised Clinical Trial.
Park H(#)(1)(2), Yang JH(#)(3), Ahn JM(1), Kang DY(1), Lee PH(1), Kim TO(1), Choi KH(3), Kang PJ(4), Jung SH(4), Yun SC(5), Park DW(1), Lee SW(1), Park SJ(1), Kim MS(1).
ABSTRACT
AIMS: Few studies have reported data on the optimal timing of left ventricular (LV) unloading during venoarterial extracorporeal membrane oxygenation (VA-ECMO) for cardiac arrest or shock. This study evaluated the feasibility of an early LV unloading strategy compared with a conventional strategy in VA-ECMO. METHODS AND RESULTS: Between December 2018 and August 2022, 60 patients at two institutions were randomised in a 1:1 ratio to receive early (n = 30) or conventional (n = 30) LV unloading strategies. The early LV unloading strategy was defined as LV unloading performed at the time of VA-ECMO insertion. LV unloading was performed using a percutaneous transseptal left atrial cannulation via the femoral vein incorporated into the ECMO venous circuit. The early and conventional LV unloading groups included 29 (96.7%) and 23 (76.7%) patients, respectively (median time from VA-ECMO insertion to LV unloading: 48.4 h, interquartile range 47.8-96.5 h). The groups showed no significant differences in the rate of VA-ECMO weaning as the primary endpoint (70.0% vs. 76.7%; relative risk, 0.91; 95% confidence interval, 0.67-1.24; P = 0.386) and survival to discharge (53.3% vs. 50.0%, P = 0.796). However, the pulmonary congestion score index at 48 h after LV unloading was significantly improved only in the early LV unloading group (2.0 ± 0.7 vs. 1.7 ± 0.6 at baseline vs. at 48 h; P = 0.008). CONCLUSION: Compared with the conventional approach, early LV unloading did not improve the VA-ECMO weaning rate, despite the rapid improvement in pulmonary congestion. Therefore, the results of this study do not support the application of this strategy after VA-ECMO insertion.

5. Resusc Plus. 2023 Aug 10;15:100443. doi: 10.1016/j.resplu.2023.100443. eCollection 2023 Sep.
Hypothermic cardiac arrest patients admitted to hospital who were not rewarmed with extracorporeal life support: A retrospective study.
Hall N(1), Métrailler-Mermoud J(2), Cools E(3), Fehlmann C(4), Carron PN(1), Rousson V(5), Grabherr S(6)(7), Schrag B(8), Kirsch M(9), Frochaux V(2), Pasquier M(1).
ABSTRACT

AIMS: Our goal was to study hypothermic cardiac arrest (CA) patients who were not rewarmed by Extracorporeal Life Support (ECLS) but were admitted to a hospital equipped for it. The focus was on whether the decisions of non-rewarming, meaning termination of resuscitation, were compliant with international guidelines based on serum potassium at hospital admission. METHODS: We retrospectively included all hypothermic CA who were not rewarmed, from three Swiss centers between 1st January 2000 and 2nd May 2021. Data were extracted from medical charts and assembled into two groups for analysis according to serum potassium. We identified the criteria used to terminate resuscitation. We also retrospectively calculated the HOPE score, a multivariable tool predicting the survival probability in hypothermic CA undergoing ECLS rewarming. RESULTS: Thirty-eight victims were included in the study. The decision of non-rewarming was compliant with international guidelines for 12 (33%) patients. Among the 36 patients for whom the serum potassium was measured at hospital admission, 24 (67%) had a value that - alone - would have indicated ECLS. For 13 of these 24 (54%) patients, the HOPE score was <10%, meaning that ECLS was not indicated. The HOPE estimation of the survival probabilities, when used with a 10% threshold, supported 23 (68%) of the non-rewarming decisions made by the clinicians. CONCLUSIONS: This study showed a low adherence to international guidelines for hypothermic CA patients. In contrast, most of these non-rewarming decisions made by clinicians would have been compliant with current guidelines based on the HOPE score.

6. Eur J Emerg Med. 2023 Oct 1;30(5):376-378. doi: 10.1097/MEJ.0000000000001062. Epub 2023 Aug 29.

Prehospital extracorporeal cardiopulmonary resuscitation: a retrospective French regional centers experience.

Le Balc'h P(1), Isslame S(1), Fillatre P(2), Flecher E(3)(4), Launey Y(1)(3)(5).

NO ABSTRACT AVAILABLE

EXPERIMENTAL RESEARCH

1. Am J Emerg Med. 2023 Aug 25;73:145-153. doi: 10.1016/j.ajem.2023.08.041. Online ahead of print.

The effects of methylene blue during and after cardiac arrest in a porcine model; a randomized, blinded, placebo-controlled study.

Johannsen CM(1), Nørholt C(1), Baltsen C(1), Eggertsen MA(1), Magnussen A(2), Vormfenne L(2), Mortensen SØ(2), Hansen ESS(3), Vammen L(1), Andersen LW(4), Granfeldt A(5).

ABSTRACT

PURPOSE: To evaluate the effect of methylene blue administered as a bolus on return of spontaneous circulation (ROSC), lactate levels, vasopressor requirements, and markers of neurological injury in a clinically relevant pig model of cardiac arrest. MATERIALS AND METHODS: 40 anesthetized pigs were subjected to acute myocardial infarction and 7 min of untreated cardiac arrest. Animals were randomized into three groups: one group received saline only (controls), one group received 2 mg/kg methylene blue and saline (MB + saline), and one group received two doses of 2 mg/kg methylene blue (MB + MB). The first intervention was given after the 3rd rhythm analysis, while the second dose was administered one hour after achieving ROSC. Animals underwent intensive care and observation for six hours, followed by cerebral magnetic resonance imaging (MRI). The primary outcome for this study was development in lactate levels after cardiac arrest. Categorical data were compared using Fisher's exact test and pointwise data were analyzed using one-way analysis of variance (ANOVA) or equivalent non-parametric test. Continuous data collected over time were analyzed using a linear mixed effects model. A value of $p < .05$ was considered statistically significant. RESULTS: Lactate levels increased in all groups after cardiac arrest

and resuscitation, however lactate levels in the MB + MB group decreased significantly faster compared with the control group (p = .007) and the MB + saline group (p = .02). The proportion of animals achieving initial ROSC was similar across groups: 11/13 (85%) in the control group, 10/13 (77%) in the MB + saline group, and 12/14 (86%) in the MB + MB group (p = .81). Time to ROSC did not differ between groups (p = .67). There was no significant difference in accumulated norepinephrine dose between groups (p = .15). Cerebral glycerol levels were significantly lower in the MB + MB group after resuscitation compared with control group (p = .03). However, MRI data revealed no difference in apparent diffusion coefficient, cerebral blood flow, or dynamic contrast enhanced MR perfusion between groups. CONCLUSION: Treatment with a bolus of methylene blue during cardiac arrest and after resuscitation did not significantly improve hemodynamic function. A bolus of methylene blue did not yield the neuroprotective effects that have previously been described in animals receiving methylene blue as an infusion.

2. Comput Methods Programs Biomed. 2023 Aug 25;241:107780. doi: 10.1016/j.cmpb.2023.107780. Online ahead of print.

Ventricular fibrillation waveform properties influenced by thoracic impedance guided chest compressions in a porcine model.

McAlister O(1), Harvey A(2), McCartney B(3), Crawford P(4), Bond RR(5), Finlay DD(5), McEneaney D(6).

ABSTRACT

BACKGROUND AND OBJECTIVE: Quantitative measures extracted from ventricular fibrillation (VF) waveform reflect the metabolic state of the myocardium and are associated with survival outcome. The quality of delivered chest compressions during cardiopulmonary resuscitation are also linked with survival. The aim of this research is to explore the viability and effectiveness of a thoracic impedance (TI) based chest compression (CC) guidance system to control CC depth within individual subjects and influence VF waveform properties. METHODS: This porcine investigation includes an analysis of two protocols. CC were delivered in 2 min episodes at a constant rate of 110 CC min-1. Subject-specific CC depth was controlled using a TI-thresholding system where CC were performed according to the amplitude (ZRMS, 0.125 to 1.250 Ω) of a band-passed TI signal (ZCC). Protocol A was a retrospective analysis of a 12-porcine study to characterise the response of two VF waveform metrics: amplitude spectrum area (AMSA) and mean slope (MS), to varying CC quality. Protocol B was a prospective 12-porcine study to determine if changes in VF waveform metrics, due to CC quality, were associated with defibrillation outcome. RESULTS: Protocol A: A directly proportional relationship was observed between ZRMS and CC depth applied within each subject (r = 0.90; p <0.001). A positive relationship was observed between ZRMS and both AMSA (p <0.001) and MS (p <0.001), where greater TI thresholds were associated with greater waveform metrics. PROTOCOL B: MS was associated with return of circulation following defibrillation (odds ratio = 2.657; p = 0.043). CONCLUSION: TI-thresholding was an effective way to control CC depth within-subjects. Compressions applied according to higher TI thresholds evoked an increase in AMSA and MS. The response in MS due to deeper CC resulted in a greater incidence of ROSC compared to shallow chest compressions.

CASE REPORTS

1. BMC Cardiovasc Disord. 2023 Aug 31;23(1):431. doi: 10.1186/s12872-023-03477-4.

Peripheral VA-ECMO and pericardial drainage connected to the ECMO circuit for cardiac tamponade from blowout rupture: a case report.

Kato T(1), Miyagawa A(2), Hikone M(3), Yuri K(2), Sugiyama K(3).

ABSTRACT

BACKGROUND: Left ventricular free wall rupture, particularly the blowout type, is still one of the most lethal complications of myocardial infarction and can cause catastrophic cardiac tamponade. Extracorporeal membrane oxygenation (ECMO) is often used to treat haemodynamic instability due to cardiac tamponade. However, elevated pericardial pressure can cause collapse of the right atrium, resulting in inadequate ECMO inflow and preventing the stabilisation of the circulation. Further, it can interfere with the venous return from the superior vena cava (SVC), increasing the intracranial pressure and reducing cerebral perfusion levels. CASE PRESENTATION: A 65-year-old man was hospitalised for out-of-hospital cardiac arrest. We used ECMO for cardiopulmonary resuscitation. After the establishment of ECMO, transthoracic echocardiography and left ventriculography revealed massive pericardial effusion. The treatment was supplemented with pericardial drainage since ECMO flow was frequently hampered by suction events. However, the blowout rupture led to the requirement of constant drainage from the pericardial catheter. To tend to this leak, we connected the venous cannula of ECMO and the pericardial drainage catheter. The surgery was performed with stable circulation without suction failure of ECMO. During the course of the intensive care management, the neurological prognosis of the patient was revealed to be poor, and the patient was shifted to palliative care. Unfortunately, the patient died on day 10 of hospitalisation. CONCLUSION: We present a case wherein the combination of pericardial drainage and ECMO was used to maintain circulation in a patient with massive pericardial effusion due to cardiac rupture.

2. Eur Heart J Case Rep. 2023 Aug 18;7(8):ytad386. doi: 10.1093/ehjcr/ytad386. eCollection 2023 Aug.

Pancoronary vasospasm with out-of-hospital cardiac arrest.

Shabbir A(1), Chipayo-Gonzales D(1), Escaned J(1), Mejía-Rentería H(1).

NO ABSTRACT AVAILABLE

3. Acta Med Port. 2023 Sep 1;36(9):598-602. doi: 10.20344/amp.19624. Epub 2023 Jun 16.

Arrhythmogenic Left Ventricular Cardiomyopathy: A Successful Case of Extracorporeal Cardiopulmonary Resuscitation.

Gama M(1), Cardoso I(2), Palma Anselmo M(3), Aguiar Rosa S(2), Gaspar da Costa P(1), Fortuna P(1).

ABSTRACT

A 24-year-old man suffered a witnessed cardiac arrest after a padel game. Basic life support was immediately provided. The pre-hospital emergency services team continued the resuscitation efforts, and the patient was accepted for extracorporeal cardiopulmonary resuscitation. The return of spontaneous circulation was achieved in 45 minutes. The initial assessment revealed a ST-segment elevation in leads V4-V6 and a dilated left ventricle with severe systolic dysfunction. Coronary angiography was normal. An improvement in left ventricular systolic function was observed and extracorporeal cardiac support was discontinued after 48 hours. Cardiovascular magnetic resonance imaging demonstrated hypokinesia and subepicardial fatty infiltration of the left ventricle lateral wall. Genetic testing detected a variant of uncertain significance in the ANK2 gene. The diagnosis of arrhythmogenic left ventricular myocardiopathy did not fulfill all the current diagnostic criteria, but it is a very likely diagnosis. An implantable cardioverter-defibrillator was placed. The patient was discharged without physical or cognitive impairment.

4. Cureus. 2023 Jul 29;15(7):e42664. doi: 10.7759/cureus.42664. eCollection 2023 Jul.

Sudden Cardiac Arrest: A Rare Clinical Presentation of Primary Aldosteronism.

Costa Filho FF(1), Costa TA(2), Furlan A(1), de Sa GA(3), Almeida MQ(4), Conceicao-Souza GE(3).

ABSTRACT
Sudden cardiac arrest (SCA) may be related to reversible causes in up to 50% of cases, such as electrolyte imbalances. Primary aldosteronism (PA) is characterized by excessive autonomic aldosterone production and can present with hypokalemia. We present an uncommon case of a 36-year-old woman who was diagnosed with PA after two episodes of ventricular fibrillation, secondary to severe hypokalemia.

5. Eur Heart J Case Rep. 2023 Aug 17;7(8):ytad402. doi: 10.1093/ehjcr/ytad402. eCollection 2023 Aug.
Unexpected deformation of the right coronary artery during percutaneous coronary intervention with venoarterial extracorporeal membrane oxygenation combined with Impella: a case report.
Sugane H(1), Hoji H(1), Kawai K(1).
ABSTRACT
BACKGROUND: The establishment of cautionary notes regarding percutaneous coronary intervention (PCI) with venoarterial extracorporeal membrane oxygenation combined with Impella (ECMELLA) is still lacking. CASE SUMMARY: A 68-year-old man was transferred to our hospital with cardiac arrest. ECMELLA insertion was performed via the bilateral femoral artery and vein for refractory ventricular fibrillation. Coronary angiography revealed an occluded lesion in the right coronary artery (RCA). Contrast injection was administered after confirming backflow through the guide catheter (GC) to avoid coronary dissection because the artery pressure was non-pulsatile during total circulation support. Prudent coronary angiography revealed a couple of accordion phenomena. Additionally, coronary angiography showed a shorter distance from the right border of the cardiac silhouette to the RCA and the venous line of extracorporeal membrane oxygenation than before PCI. This drastic change in the cardiac silhouette suggested that ECMELLA induced the collapse of the right heart system. Subsequently, a drug-eluting stent was implanted successfully. Final coronary angiography confirmed severe bending in the proximal segment of the RCA, which was absent in the reference coronary angiography. The patient had an uneventful course except for mild cognitive impairment. The computed tomography coronary angiography after ECMELLA removal indicated the RCA without deformation. DISCUSSION: In the present case, the collapse of the right heart system caused by ECMELLA resulted in RCA deformation. This case also underscored that contrast injection to the coronary artery in total circulation support should be administered after confirmation of backflow through a GC.

6. Eur Heart J Case Rep. 2023 Aug 7;7(8):ytad371. doi: 10.1093/ehjcr/ytad371. eCollection 2023 Aug.
Two severe complications post-percutaneous intramyocardial septal radiofrequency ablation in a patient with failed alcohol septal ablation: pulseless electrical activity cardiac arrest and pericardial tamponade-a case report.
Shu T(1), Shen C(1), Chen X(1), Yu F(1).
ABSTRACT
BACKGROUND: Alcohol septal ablation (ASA) can be recommended for patients with drug-refractory hypertrophic obstructive cardiomyopathy (HOCM). Recently, percutaneous intramyocardial septal radiofrequency ablation (PIMSRA) was reported as a safe and effective treatment for HOCM. CASE SUMMARY: We present a case report of pulseless electrical activity (PEA), cardiac arrest, and pericardial tamponade occurring post-PIMSRA. We performed PIMSRA for the patient with HOCM after failed ASA. Two hours post-PIMSRA, transthoracic echocardiography (TTE) revealed that the hypokinetic basal intraventricular septal (IVS) thickness increased with aggravation of systolic anterior motion of the mitral valve. After the occurrence of subsequent PEA cardiac arrest, veno-arterial extracorporeal membrane oxygenation (VA-ECMO) support was provided. With sinus rhythm

restoration and blood pressure stabilization after ECMO removal, the patient had pericardial tamponade on Day 3 post-PIMSRA. After excluding apparent myocardial perforation and draining haemorrhagic effusion under TTE guidance, her symptoms and haemodynamic status improved. She was asymptomatic at her one-year follow-up. The left ventricular outflow tract gradient (LVOTG) at rest and the thickness of the basal IVS reduced to 5 mmHg and 12 mm, respectively. DISCUSSION: We assumed that the main causes of PEA cardiac arrest and pericardial tamponade in our case were ablation-related tissue oedema at the basal IVS and blood leakage possibly related to puncture haemorrhage, respectively. While waiting for myocardial oedema to resolve, ECMO was applied as a bridge-to-recovery therapeutic approach. Pericardiocentesis is a strategy for the emergency drainage of pericardial effusion. It is essential to distinguish life-threatening complications with TTE for management planning post-PIMSRA.